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10/820,964	04/07/2004	Kazuhisa Fujimoto	H-5028	9555

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MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER	
SAVLA, ARPAN P	

ART UNIT	PAPER NUMBER
2185	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/820,964	FUJIMOTO ET AL.	
	Examiner	Art Unit	
	Arpan P. Savla	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/27/07, page 5*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This Office action is in response to Applicant's communication filed April 18, 2007 in response to the Office action dated December 27, 2006. Claims 22-35 and 37-38 have been amended. New claims 44-53 have been added. Claims 21-53 are pending in this application.

ACKNOWLEDGMENT OF REFERENCES CITED BY APPLICANT

Information Disclosure Statement

1. References AB-AJ were in fact considered on December 19, 2006, as such the Examiner apologizes for inadvertently not initialing references AB-AJ on page 5 of the Information Disclosure Statement (IDS) dated April 27, 2006. An updated copy of page 5 of the IDS is initialed and dated by the Examiner is attached to the instant Office action.

OBJECTIONS

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "STORAGE SYSTEM HAVING PROCESSOR AND INTERFACE ADAPTERS THAT CAN BE INCREASED OR DECREASED BASED ON REQUIRED PERFORMANCE"

Claims

3. The Examiner appreciates Applicant pointing out the inadvertent error made by the Examiner. In view of Applicant's amendments and remarks, the objections to claims **22-35 and 37-38** have been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 21-43 are rejected under 35 U.S.C. 103(a) as being obvious over Hubis et al. (U.S. Patent 6,343,324) in view of Kuchta et al. (U.S. Patent 6,014,319).

6. **As per claim 21**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

a plurality of disk drives (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said disk drives (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drives (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180); *It should be noted that the "Processor 180" is analogous to the "processor adapter."*

a plurality of first interface adapters each coupled to at least one said host . computer and receiving a write request and data sent from said at least one host computer and sending a first control information related to said write request to at least one of said processor adapters and sending data received at each of said first interface adapters based on a second control information sent from said at least one processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1 – 184-M); *It should be noted that the "I/O Processors 184-1-M" are analogous to the "plurality of first interface adapters."*

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186); *It should be noted that the "Data Cache Memory" is analogous to the "memory adapter."*

a plurality of second interface adapters each receiving data stored in said memory adapter from said memory adapter based on a third control information sent from said at least one processor adapter and storing data received at each of said second interface adapters in said disk drives (col. 16, lines 3-6; Fig. 2A, element 185-1); *It should be noted that the "I/O Processors 185-1-M" are analogous to the "plurality of second interface adapters."*

a switch adapter coupled to said processor adapters, said first interface adapters, said memory adapter and said second interface adapters and relaying data between said first interface adapters and said memory adapter and relaying data between said memory adapter and said second interface adapters (col. 15, lines 63-66; Fig. 2A,

element 183); *It should be noted that the "PCI Bus Interface and Memory Controller" is analogous to the "switch adapter."*

wherein said switch adapter relays said first and said second control information between said processor adapters and said first interface adapters and relays said third control information between said processor adapters and said second interface adapters (col. 15, lines 63-66; col. 16, lines 6-9); *It should be noted that the Processor is coupled to the system only through the PCI Bus Interface and Memory Controller, therefore, all control information is required to be relayed via the PCI Bus Interface and Memory Controller.*

Hubis does not expressly disclose a plurality of processor adapters;

wherein the number of said processor adapters are increased or decreased based on a required performance.

Kutcha discloses a plurality of processor adapters (col. 5, lines 47-58; Fig. 2B, elements 209-212); *It should be noted that the "I/O modules" are analogous to the "processor adapters."*

wherein the number of said processor adapters are increased or decreased based on a required performance (col. 5, lines 59-63).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 21.

7. **As per claim 22**, the combination of Hubis/Kuchta discloses said processor adapters are independently attached to or detached from said first interface adapters (Kutcha, col. 5, lines 42-45 and 59-63; Fig. 2A, element 245). *It should noted that the "I/O cards" are analogous to the "interface adapters." It should also be noted that the I/O modules are added independently of the I/O cards.*

8. **As per claim 23**, the combination of Hubis/Kuchta discloses said processor adapters are assigned to a process of at least one said first interface adapter and a process of at least one said second interface adapter (Hubis, col. 16, lines 6-9).

9. **As per claim 24**, the combination of Hubis/Kuchta discloses said at least one processor adapter is assigned to said plurality of first interface adapters (Hubis, col. 16, lines 6-9).

10. **As per claim 25**, the combination of Hubis/Kuchta discloses said at least one processor adapter is assigned to said plurality of second interface adapters (Hubis, col. 16, lines 6-9).

11. **As per claim 26**, the combination of Hubis/Kuchta discloses it is possible to increase or decrease the number of said processor adapters in case that the number of said first interface adapters is not increased or decreased (Kutcha, col. 5, lines 42-45 and 59-63).

12. **As per claim 27**, the combination of Hubis/Kuchta discloses it is possible to change the number of said processor adapters on storing data in said disk drives (Kutcha, col. 5, lines 42-45 and 59-63).

13. **As per claim 28**, the combination of Hubis/Kuchta discloses the number of said processor adapters is increased or decreased in accordance with the number of said first interface adapters being increased or decreased (Kuchta, col. 5, lines 42-45 and 47-63).

14. **As per claim 29**, the combination of Hubis/Kuchta discloses a first portion of said processor adapters are assigned to a process of at least one of said first interface adapters (Kutcha, col. 7, lines 15-18; Fig. 2A, element 245; Fig. 2B, elements 211-212); *It should be noted that "I/O modules 211-212" are analogous to the "first portion of processor adapters" and "I/O cards 245" are analogous to "first interface adapters."*

a second portion of said processor adapters are assigned to a process of at least one of said second interface adapters (Kuchta, col. 7, lines 35-38; Fig. 2A, element 246; Fig. 2B, elements 209-210); *It should be noted that "I/O modules 209-210" are analogous to the "second portion of processor adapters" and "I/O cards 246" are analogous to "second interface adapters."*

a proportion between said first portion and said second portion is decided in accordance with a proportion between a performance of said at least one first interface adapter and a performance of said at least one second interface adapter (Kutcha, col. 5, 59-63). *It should be noted that amount of I/O modules 209-210 versus the amount of*

I/O modules 211-212 (i.e. a proportion between said first portion and said second portion) is based on performance characteristics.

15. **As per claim 30**, the combination of Hubis/Kuchta discloses said first control information is used to notify said at least one processor adapter of receiving said write request (Hubis, col. 15, lines 10-25).

16. **As per claim 31**, the combination of Hubis/Kuchta discloses said at least one processor adapter detects an area of said memory in which data of said logical volume need to be stored in accordance with said received first control information (Hubis, col. 15, lines 19-25; col. 16, line 67 – col. 17, line 9). *It should be noted that it is inherently required Processor 180 detect/recognize an area of the Data Cache Memory in order to allocate space for storing data in the Cache Memory during a write task.*

17. **As per claim 32**, the combination of Hubis/Kuchta discloses said second control information includes information related to an area of said memory in which data received at said first interface adapter need to be stored (Hubis, col. 15, lines 19-25; col. 16, line 67 – col. 17, line 9). *It should be noted that it is inherently required Processor 180 allocate/reserve an area of the Data Cache Memory in order to store data in the Cache Memory during a write task.*

18. **As per claim 33**, the combination of Hubis/Kuchta discloses said at least one processor adapter finds an area of said disk drives related to said logical volume for storing data of said logical volume based on said received first control information (Hubis, col. 15, lines 23-25; col. 16, lines 6-9).

19. **As per claim 34**, the combination of Hubis/Kuchta discloses said third control information includes information related to an area of said disk drives in which data received at said second interface adapter need to be stored (Hubis, col. 15, lines 23-25; col. 16, lines 6-9).

20. **As per claim 35**, the combination of Hubis/Kuchta discloses said at least one processor adapter controls to create a parity data of RAID (Redundant Array of Inexpensive Disks) from data received at least one of said first interface adapters (Hubis, col. 4, line 64 – col. 5, line 3).

21. **As per claim 36**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drive (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180); *It should be noted that the "Processor 180" is analogous to the "processor adapter."*

a first interface adapter coupled to said host computer and receiving a write request and data sent from said host computer and sending a first control information related to said write request to said processor adapter and sending data received at said first interface adapter based on a second control information sent from said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 –

col. 16, line 3; Fig. 2A, element 184-1); *It should be noted that the "I/O Processor 184-1" is analogous to the "first interface adapter."*

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

a second interface adapter receiving data stored in said memory adapter from said memory adapter based on a third control information sent from said processor adapter and storing data received at said second interface adapter in said disk drive (col. 16, lines 3-6; Fig. 2A, element 185-1); *It should be noted that the "I/O Processor 185-1" is analogous to the "second interface adapter."*

a switch adapter coupled to said processor adapter, said first interface adapter, said memory adapter and said second interface adapter and relaying said data among said first interface adapter, said memory adapter and said second interface adapter (col. 15, lines 63-66; Fig. 2A, element 183);

wherein said switch adapter relays said first and said second control information between said processor adapter and said first interface adapter and relays said third control information between said processor adapter and said second interface adapter (col. 15, lines 63-66; col. 16, lines 6-9); *It should be noted that the Processor is coupled to the system only through the PCI Bus Interface and Memory Controller, therefore, all control information is required to be relayed via the PCI Bus Interface and Memory Controller.*

Hubis does not expressly disclose the number of said processor are increased or decreased, if the number of said first interface adapter, said memory adapter and said second interface adapter are not increased or decreased.

Kuchta discloses the number of said processor are increased or decreased, if the number of said first interface adapter, said memory adapter and said second interface adapter are not increased or decreased (col. 5, lines 42-45 and 47-63; Fig. 2A, element 245; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 36.

22. **As per claim 37**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drive (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer and receiving data sent from said host computer and sending data received at said first interface adapter based on a first control information sent from said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

a second interface adapter receiving data stored in said memory adapter from said memory adapter based on a second control information sent from said processor adapter and storing data received at said second interface adapter in said disk drive (col. 16, lines 3-6; Fig. 2A, element 185-1);

a switch adapter coupled to said processor adapter, said first interface adapter, said memory adapter and said second interface adapter and relaying data of said logical volume among said first interface adapter, said memory adapter and said second interface adapter and not relaying data of said logical volume to said processor adapter (col. 15, lines 63-66; Fig. 2A, element 183); *It should be noted that when the host sends a read request to the logical volumes, Processor 180 does not receive the read data itself, but rather controls the process of sending the read data back to the host.*

wherein said switch adapter relays said first control information between said processor adapter and said first interface adapter and relays said second control information between said processor adapter and said second interface adapter (col. 15, lines 63-66; col. 16, lines 6-9); *It should be noted that the Processor is coupled to the system only through the PCI Bus Interface and Memory Controller, therefore, all control information is required to be relayed via the PCI Bus Interface and Memory Controller.*

Hubis does not expressly disclose it is possible to change the number of said processor adapter on storing on storing data in said disk drives.

Kuchta discloses it is possible to change the number of said processor adapter on storing on storing data in said disk drives (col. 5, lines 47-63; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 37.

23. **As per claim 38**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drive (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

a second interface adapter coupled to said first interface adapter, said processor adapter, and said memory adapter (col. 16, lines 3-6; Fig. 2A, element 185-1);

a switch adapter coupled to said processor adapter, said first interface adapter, said memory adapter and said second interface adapter (col. 15, lines 63-66; Fig. 2A, element 183);

wherein said switch adapter relays data between said first interface adapter and said second interface adapter via said memory adapter among said first interface adapter, said processor adapter, said memory adapter and said second interface adapter based on control information transferred among said first interface adapter, said processor adapter and said second interface adapter of said first interface adapter, said processor adapter, said memory adapter, and said second interface adapter (col. 15,

lines 63-66; col. 15, line 67 – col. 16, line; Fig. 2A, elements 183 and 186). *It should be noted that Data Cache Memory buffers any data sent between I/O Processor 184-1 and I/O Processor 185-1.*

Hubis does not expressly disclose the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased.

Kuchta discloses the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased (col. 5, lines 47-63; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 38.

24. **As per claim 39**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drive (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer and receiving a write request and data sent from said host computer and sending a first control information related to said write request to said processor adapter and sending data received at said first interface adapter based on a second control information sent from said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

a second interface adapter receiving data stored in said memory adapter from said memory adapter based on a third control information sent from said processor adapter and storing data received at said second interface adapter in said disk drive (col. 16, lines 3-6; Fig. 2A, element 185-1);

wherein said processor adapter coupled to said first interface adapter and said second interface adapter and sends said second control information to said first interface adapter and sends said third control information to said second interface adapter (col. 16, lines 6-9);

wherein said first interface adapter sends data to said memory adapter among said processor adapter, said memory adapter and said second interface adapter (col. 15, line 67 – col. 16, line 3);

wherein said second interface adapter receives data from said memory adapter among said processor adapter, said memory adapter and said first interface adapter (col. 16, lines 3-6);

wherein said memory adapter receives data from said first interface adapter and said second interface adapter among said processor adapter, said first interface adapter and said second interface adapter (col. 15, line 67 – col. 16, line 6);

Hubis does not expressly disclose the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased based on a required performance.

Kuchta discloses the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased based on a required performance (col. 5, lines 47-63; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 39.

25. **As per claim 40**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

a plurality of disk drives (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said disk drives (col. 7, lines 27-28; Fig. 2, element 108);

at least one processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drives (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

at least one first interface adapter coupled to said host computer and receiving data sent from said host computer and sending data received at said first interface adapter based on a first control information sent from said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

at least one a second interface adapter receiving data stored in said memory adapter from said memory adapter based on a second control information sent from said processor adapter and storing data received at said second interface adapter in said disk drives (col. 16, lines 3-6; Fig. 2A, element 185-1);

wherein said processor adapter coupled to said first interface adapter and said second interface adapter and sends said first control information to said first interface adapter and sends said second control information to said second interface adapter (col. 16, lines 6-9);

wherein said first interface adapter sends data of said logical device volume to said memory adapter among said processor adapter, said memory adapter and said second interface adapter (col. 15, lines 19-22; col. 15, line 67 – col. 16, line 3); *It should be noted that when a write request is received, data to be written into the logical device is buffered in the Data Cache Memory.*

wherein said second interface adapter receives data of said logical volume from said memory adapter among said processor adapter, said memory adapter and said first interface adapter (col. 15, lines 19-22; col. 16, lines 3-6); *It should be noted that when a read request is received, data read from the logical device is buffered in the Data Cache Memory.*

wherein said memory adapter receives data of said logical volume from said first interface adapter and said second interface adapter among said processor adapter, said first interface adapter and said second interface adapter (col. 15, line 67 – col. 16, line 6).

Hubis does not expressly disclose the number of said processor adapter is increased or decreased in accordance with the number of said first interface adapter is increased or decreased.

Kuchta discloses the number of said processor adapter is increased or decreased in accordance with the number of said first interface adapter is increased or decreased (col. 5, lines 42-45 and 47-63; Fig. 2A, element 245; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 40.

26. **As per claim 41**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to store data, which are sent from said host computer to said logical volume for updating said logical volume, in said disk drive (col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer and receiving data sent from said host computer and sending data received at said first interface adapter based on a first control information sent from said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a memory adapter having at least one memory, said memory temporarily storing data sent from said first interface adapter (col. 15, line 67 – col. 16, line 3; Fig. 2A, element 186);

a second interface adapter receiving data stored in said memory adapter from said memory adapter based on a second control information sent from said processor adapter and storing data received at said second interface adapter in said disk drive (col. 16, lines 3-6; Fig. 2A, element 185-1);

wherein said processor adapter coupled to said first interface adapter and said second interface adapter and sends said first control information to said first interface adapter and sends said second control information to said second interface adapter (col. 16, lines 6-9);

wherein said first interface adapter sends said data received at said first interface adapter to said memory adapter and does not send said data received at said first interface adapter to said processor adapter (col. 15, line 67 – col. 16, line 3); *It should be noted that when the host sends a write request to the logical volumes, Processor 180 does not receive the write data itself, but rather controls the process of sending the write data to the logical volume.*

wherein said second interface adapter receives said data stored in said memory adapter from said memory adapter and does not receive said data stored in said memory adapter from said processor adapter (col. 16, lines 3-6); *It should be noted that when the host sends a write request to the logical volumes, Processor 180 does not receive the write data itself, but rather controls the process of sending the write data to the logical volume. Therefore, the data sent to I/O Processor 185-1 from the Data Cache Memory is not from the Processor 180.*

wherein said memory adapter receives said data sent from said first interface adapter and does not receive data from said processor adapter (col. 15, line 67 – col. 16, line 3); *See the citation note for the limitation directly above.*

Hubis does not expressly disclose the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased.

Kuchta discloses the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased (col. 5, lines 47-63; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 41.

27. **As per claim 42**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to read data, which are related to a read request sent from said host computer to said logical volume for reading data of said logical volume, from said disk drive (col. 15, lines 19-25; col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer and receiving said read request and sending a first control information related to said read request to said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a second interface adapter receiving data stored in said disk drive from said disk drive based on a second control information sent from said processor adapter and storing data received at said second interface adapter in said memory adapter (col. 16, lines 3-6; Fig. 2A, element 185-1);

a memory adapter having at least one memory, said memory storing data sent from said second interface adapter; (col. 16, lines 3-6; Fig. 2A, element 186);

a switch adapter coupled to said processor adapter, said first interface adapter, said memory adapter and said second interface adapter and relaying data received at said second interface adapter between said second interface adapter and said memory adapter and relays said first control information between said first interface adapter and said processor adapter and relays said second control information between said processor adapter and said second interface adapter (col. 15, lines 63-66; Fig. 2A, element 183); *It should be noted that the Processor is coupled to the system only through the PCI Bus Interface and Memory Controller, therefore, all control information is required to be relayed via the PCI Bus Interface and Memory Controller.*

wherein said first interface adapter receives data stored in said memory adapter from said memory adapter based on a third control information sent from said processor adapter and sends data received at said first interface adapter to said host computer (col. 15, line 67 – col. 16, line 3);

wherein said switch adapter relays data stored in said memory adapter between said memory adapter and said first interface adapter and relays said third control information between said processor adapter and said first interface adapter (col. 15, lines 63-66; Fig. 2A, element 183); *It should be noted that the Processor is coupled to the system only through the PCI Bus Interface and Memory Controller, therefore, all control information is required to be relayed via the PCI Bus Interface and Memory Controller.*

Hubis does not expressly disclose the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased based on a required performance.

Kuchta discloses the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased based on a required performance (col. 5, lines 47-63; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 42.

28. **As per claim 43**, Hubis discloses a storage system coupled a host computer, said storage system comprising:

at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

at least one logical volume configured by said at least one disk drive (col. 7, lines 27-28; Fig. 2, element 108);

a processor adapter having at least one processor and controlling to read data, which are related to a read request sent from said host computer to said logical volume

for reading data of said logical volume, from said disk drive (col. 15, lines 19-25; col. 15, line 67 – col. 16, line 9; Fig. 2A, element 180);

a first interface adapter coupled to said host computer and receiving said read request and sending a first control information related to said read request to said processor adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 – col. 16, line 3; Fig. 2A, element 184-1);

a second interface adapter receiving data stored in said disk drive from said disk drive based on a second control information sent from said processor adapter and storing data received at said second interface adapter in said memory adapter (col. 16, lines 3-6; Fig. 2A, element 185-1);

a memory adapter having at least one memory, said memory storing data sent from said second interface adapter; (col. 16, lines 3-6; Fig. 2A, element 186);

wherein said first interface adapter receives data stored in said memory adapter and sends data received at said first interface adapter to said host computer based on a third control information sent from said processor adapter (col. 15, line 67 – col. 16, lines 9);

wherein said processor adapter coupled to said first interface adapter and said second interface adapter and receives said first control information from said first interface adapter and sends said second control information to said second interface adapter and sends said third control information to said first interface adapter (col. 7, line 64 – col. 8, line 5; col. 15, lines 19-25; col. 15, line 67 – col. 16, line 6);

wherein said first interface adapter receives data from said memory adapter among said processor adapter, said memory adapter and said second interface adapter (col. 15, line 67 – col. 16, line 3);

wherein said second interface adapter sends data to said memory adapter among said processor adapter, said memory adapter and said first interface adapter (col. 16, lines 3-6);

wherein said memory adapter receives data from said second interface adapter among said processor adapter, said first interface adapter and said second interface adapter (col. 16, lines 3-6);

Hubis does not expressly disclose wherein the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased, if the number of said first interface adapter, said memory adapter and said second interface adapter are not increased or decreased.

Kutcha discloses wherein the number of a plurality of processor adapters, which each correspond to said processor adapter, are increased or decreased, if the number of said first interface adapter, said memory adapter and said second interface adapter are not increased or decreased (col. 5, lines 42-45 and 47-63; Fig. 2A, element 245; Fig. 2B, elements 209-212).

Hubis and Kuchta are analogous art because they are from the same field of endeavor, that being storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Kuchta's additional I/O modules within Hubis's storage system.

The motivation for doing so would have been to provide later system enhancements (Kuchta, col. 5, lines 49-50).

Therefore, it would have been obvious to combine Hubis and Kuchta for the benefit of obtaining the invention as specified in claim 43.

29. **As per claims 44-53**, the combination of Hubis/Kuchta discloses the memory adapter includes a control information memory module in which information for controlling data transfer is stored (Hubis, col. 15, line 67 – col. 16, line 3; col. 8, lines 2-5; Fig. 2A, element 186).

Response to Arguments

30. Applicant's arguments filed March 26, 2007 with respect to **claims 21-43** have been fully considered but they are not persuasive.

31. With respect to Applicant's argument beginning in the last paragraph on page 24 of the communication filed March 26, 2007, the Examiner respectfully disagrees and refers Applicant to the rejections above.

32. With respect to Applicant's argument in the first full paragraph on page 25 of the communication filed March 26, 2007, the Examiner respectfully disagrees. Firstly, as

can be seen from the cited portions of Hubis above, Hubis' I/O processors provide equivalent functionality as Applicant's first and second interface adaptors as defined by the claim language. Secondly, it is noted that the features upon which Applicant relies (i.e., "the first interface adaptor and the second interface adaptor of the claimed invention do NOT have a processor") are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Accordingly, Hubis' I/O processors sufficiently disclose Applicant's first interface adapter and second interface adapter.

33. With respect to Applicant's argument in the second full paragraph on page 25 of the communication filed March 26, 2007, the Examiner respectfully disagrees. As can be seen from the cited portions of Hubis above, Hubis' processor 180 provides equivalent functionality as Applicant's processor adaptor as defined by the claim language. Hubis' processor 180 coordinates the activities (i.e. send instructions) of all I/O processors, such as scheduling of tasks including read and write tasks (i.e. data transfer) and error handling. Furthermore, as with any data transfer in a computer system, it is required there be some sort of "control information" used to coordinate these read and write tasks. Accordingly, Hubis' processor 180 sufficiently discloses Applicant's processor adapter.

34. With respect to Applicant's argument beginning in the last paragraph on page 25 of the communication filed March 26, 2007, the Examiner respectfully disagrees. As can be seen from the cited portions of Hubis above, Hubis' data cache memory provides equivalent functionality as Applicant's memory adapter. Hubis' data cache memory stores information sent between the host computers and the I/O processors. A host computer initiates data transactions when it issues a data transfer command (i.e. control information) over the fibre channel bus (Hubis, col. 8, lines 2-5). Thus, it follows that this data transfer command is stored in the data cache memory for a period of time on its way to the I/O processors. Accordingly, Hubis' data cache memory sufficiently discloses Applicant's memory adapter.

35. With respect to Applicant's argument in the first full paragraph on page 26 of the communication filed March 26, 2007, the Examiner respectfully disagrees. The Examiner also apologizes for inadvertently citing elements 209-212 in Fig. 2B instead of correctly citing elements 209-212 as Applicant pointed out. As can be seen from the cited portions of Kuchta above, Kuchta's I/O modules communicate with the host computer systems and handle transfer of data between the storage devices (disks). Accordingly, Kuchta's I/O modules sufficiently disclose Applicant's processor adapters.

Conclusion

STATUS OF CLAIMS IN THE APPLICATION

The following is a summary of the treatment and status of all claims in the application as recommended by MPEP 707.70(i):

CLAIMS REJECTED IN THE APPLICATION

Per the instant office action, **claims 21-53** have received a second action on the merits and are subject of a second action final.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arpan P. Savla whose telephone number is (571) 272-1077. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on (571) 272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arpan Savla
Art Unit 2185
June 27, 2007

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100